

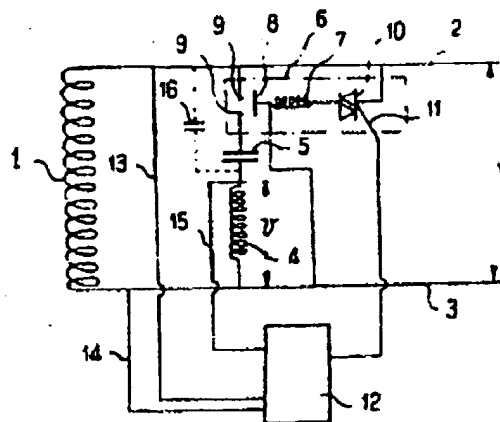
**Device for connecting a starting capacitor to a single-phase motor**

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**Abstract of FR2585900**

The device for connecting a starting capacitor 5 to a single-phase motor, according to the invention, comprises at least one main winding 1 and one auxiliary winding 4, the auxiliary winding 4 being mounted in series with the starting capacitor 5 in an auxiliary circuit mounted in parallel with the main winding 1. It is characterised in that it includes means 13, 14 for tapping a main voltage across the terminals of the main winding 1, means 15, 14 of tapping an auxiliary voltage across the terminals of the auxiliary winding 4, control means 12 connected to the tapping means for determining an instant at which the main voltage  $V$  and the auxiliary voltage  $v$  are in a predetermined ratio  $k$ , and switching means 6 in the auxiliary circuit, in series with the starting capacitor 5 and the auxiliary winding 4 and connected to the control means 12 in order to open or close the auxiliary circuit in response to signals from the control means 12.



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The present invention relates to a device of connection of a starting capacitor to an engine single-phase current.

It is known that to carry out the starting of an engine single-phase current, it is generally < RTI ID=1.1> nécessaire< /RTI> to associate a shifted auxiliary circuit of a polar half-not compared to the principal rolling up of the engine, this auxiliary circuit including/understanding an auxiliary rolling up in series with a starting capacitor. It is also known that so that the engine can reach its nominal speed, the starting capacitor owes < RTI ID=1.2> être< /RTI> disconnect after starting when the number of revolutions reached by the engine is such as the couple which the engine without its starting capacitor would have is close to the stall torque which the engine without its starting capacitor can provide.

To determine the moment of the disconnection of the starting capacitor, various devices were already used. In particular, one used devices measuring the intensity in principal rolling up or in the feeding circuit of the engine and causing the opening of a switch laid out in the auxiliary circuit when this intensity passes below a threshold predetermines corresponding to the intensity of normal current in principal rolling up when above mentioned speed is reached. However, when the supply voltage of the engine is lower than the normal tension of food, < RTI ID=1.3> l'intensité< /RTI> current is also lower than the normal intensity during the phase launching and the threshold of déconnexion of the starting capacitor is reached whereas the engine < RTI ID=1.4> a< /RTI> not reached the number of revolutions < yet; RTI ID=1.5> précitée.< /RTI>

The starting of the engine is made slower and same, if the resistive torque exerted on the engine higher than the engine torque is exerted at the time of the disconnection, the engine is blocked, which risks < RTI ID=1.6> of entraver< /RTI> its deterioration following an excessive heating.

One knows another type of comprising device of connection of the means to measure the rise of the terminal voltage of auxiliary rolling up and to disconnect the starting capacitor when the auxiliary tension reaches a predetermined threshold also corresponding at the above mentioned speed. However, in the case of an engine supply < RTI ID=2.1> a< /RTI> a tension lower than the nominal voltage, the tension of auxiliary rolling up does not reach the threshold < RTI ID=2.2> prédéterminé< /RTI> and the starting capacitor constantly remains connected, which harms < RTI ID=2.3> a< /RTI> a correct operation of the engine.

In order to free itself from the variations of the supply voltage, one also knows devices of connection in which a tachometric device, generally a switch with centrifugal order, is associated < RTI ID=2.4> a< /RTI> the tree of the engine and disconnects the starting capacitor as soon as the number of above mentioned revolutions is reached. Such a device presents < however; RTI ID=2.5> the inconve-< /RTI> deny to require a mechanical assembly < RTI ID=2.6> spécialement< /RTI> adapt.

A goal of this invention is to propose a device of connection of a starting capacitor has an engine < RTI ID=2.7> monophasé< /RTI> who does not require any particular mechanical assembly and functions < RTI ID=2.8>

- ▲ top néanmoins< /RTI> in a satisfactory way when the supply voltage of the engine is lower or higher < RTI ID=2.9> a< /RTI> the nominal voltage of this one.

For the realization of this goal, one envisages according to the invention, a device of connection of a starting capacitor to an engine < RTI ID=2.10> monophasé< /RTI> including/understanding at least a principal rolling up and an auxiliary rolling up, auxiliary rolling up being goes up in series with the starting capacitor in an auxiliary circuit assembled in parallel < RTI ID=2.11> a< /RTI> the principal rolling up, characterized in that it comprises of the means of taking away of a principal tension at the boundaries of principal rolling up, means of < RTI ID=2.12> prélèvement< /RTI> of a tension auxi liaire at the boundaries of auxiliary rolling up, means of order connected to the means of taking away to determine one moment when the principal tension and the auxiliary tension are in a predetermined report/ratio, and means of commutation in the auxiliary circuit, in series with the rolling up and starting capacitor auxiliary and connected to the means of order to open or complete auxiliary in response to signals of the means of order.

Thus, the starting capacitor is décon < RTI ID=3.1> necté< /RTI> when the report/ratio of the tensions mesurees reaches a predetermined value, independent of the effective supply voltage, since a variation of this tension is found in the same proportions in the auxiliary tension and thus is appreciably eliminated by the taking into account from the report/ratio from the tensions.

According to an advantageous version of the invention, the means of commutation comprise an electromagnetic relay including/understanding of the fixed contacts < RTI ID=3.2> separated, < /RTI> in series with the starting capacitor, a mobile contact laid out compared to the fixed contacts, and a reel of actuation gone up simultaneously with the feeding circuit of the engine and associated the mobile contact; and a semiconductor component laid out in series with the reel of actuation and having a body of blocking connects to the means of order.

Thus, in the case of an engine of strong power for which the auxiliary circuit is cross-piece by an important intensity, one uses nevertheless a semiconductor device of a power right < RTI ID=3.3> necessaire< /RTI> with the actuation of the reel.

According to another mode of realization of the invention, the means of commutation comprise a component semiconductor, preferably a triac, has in series in the auxiliary circuit and having a body of blocking connected to the means order.

Thus, for the engines of low power, the semiconductor component is directly crossed by the auxiliary current and the device of connection has a particularly simple structure.

Other characteristics and advantages of < RTI ID=4.1> 1 'inven-< /RTI> tion will still result from the description hereafter of nonrestrictive examples in reference to the drawings annexed, among < RTI ID=4.2> lesquels< /RTI> - figure 1 is a diagrammatic representation of a first mode of realization of the device according to the invention, - figure 2 is a diagrammatic representation of a second mode of realization of the device according to < RTI ID=4.3> 1 'inven-< /RTI> tion.

In reference on figure 1, principal rolling up 1 of an electric motor is connected to a supply voltage V by feeders 2 and 3 in which one can envisage a switch general not represented. The engine also includes/understands an auxiliary circuit assembled simultaneously with principal rolling up 1 and including/understanding an auxiliary rolling up 4 and one starting capacitor 5 goes up in series with auxiliary rolling up 4. The auxiliary circuit also comprises means of commutation generally indicate into 6 and including/understanding separate fixed contacts 9 in < RTI ID=4.4> serie< /RTI> with the starting capacitor < RTI ID=4.5> 5, un< /RTI> mobile contact 8 laid out compared to the fixed contacts 9 and associated a reel of actuation 7. Le electromagnetic relay thus formed is preferably of the type open at rest. The reel of actuation 7 is assembled simultaneously with the feeding circuit of the engine, in series with a semi component driver 10, such as a triac, having a body of blocking, forms here by trigger 11 of the triac, connected to the exit of means of order 12. The entries of the means of order 12 are connected on the one hand to means of taking away of a principal tension at the boundaries of < RTI ID=4.6> 1 'enroulement< /RTI> the main thing formed by a line 13 connected to the one line 14 and feeder 2 connected to the feeder 3, and in addition with means of taking away of an auxiliary tension formed by a line 15 connected on a terminal of auxiliary rolling up 4 and the line 14.

The means of order 12 are designed to determine one moment when the principal tension and the auxiliary tension are in a predetermined report/ratio.

These means are carried out in various forms known in themselves and which it is not necessary to describe in detail. For example, the means of order 12 include/understand a tension divider bridge, carrying out a division of the principal tension measured according to a report/ratio K < RTI ID=5.1> prédé-< /RTI> finished, and a comparator carrying out the comparison between the divided principal tension and the auxiliary tension measured to emit a signal when the auxiliary tension mesuree is equal to the divided principal tension.

The operation of the device according to < RTI ID=5.2> 1 'I nven-< /RTI> tion is as follows: when the engine is started, the electromagnetic relay is open and rolling up principal armature a weak tension in auxiliary rolling up. The report/ratio of the auxiliary tension to the principal tension is lower than the report/ratio predetermined K and the means of order 12 send on trigger 11 of the triac 10 a signal making this one conducting.

The reel of actuation 7 is excited and firm the circuit between the fixed terminals 9, thus bringing the starting capacitor 5 into service. As the speed of the engine increases, tension v at the boundaries of auxiliary rolling up 4 increases, until the moment when the report/ratio of the auxiliary tension to the principal tension reaches the report/ratio K. At this time, the means of order 12 stop the control signal on trigger 11, the reel of actuation 7 is de-energized and the electromagnetic relay opens again, thus putting the starting capacitor 5 except service.

One understands that the report/ratio K is not an element criticizes and varies according to the engines, according to the relative characteristics of < RTI ID=6.1> the enroulement< /RTI> the main thing 1 and of auxiliary rolling up 4. The report/ratio K is easily given for each engine, according to the number of revolutions at which one wishes to put the starting capacitor 5 except service.

Figure 2 illustrates a second mode of realization for engines of low power, including/understanding like previously a principal rolling up 1 supplied with the feeders 2 and 3 and one auxiliary circuit including/understanding auxiliary rolling up 4, the starting capacitor 5 and the means of commutation 6. In this mode of realization, the means of commutation include/understand only one semiconductor component, for example a triac < RTI ID=6.2> IO, directement< /RTI> laid out in series in the auxiliary circuit. It is understood that operation exactly identical to operation is described previously, the starting capacitor 5 being brought into service when the triac 10 is made conducting and except service when the triac 10 east blocks.

Of course, the invention is not limited to the modes of realization described above and one can bring alternatives of execution there.

In particular, although < RTI ID=6.3> one < /RTI> represented means of taking away of the principal tension connected at the extreme boundaries of principal rolling up 1, one can envisage to take the tension < RTI ID=6.4> principaleen< /RTI> an intermediate point, in particular if principal rolling up is made of several cabled parts of rolling up in a way different according to the tension from alimen tation.

One can also add a permanent condenser 16, simultaneously with the starting capacitor 5, as represented on the figures with connections in dotted lines.

Moreover, one can add time-lag safety devices or function of the temperature, associated a power switch stopping the engine supply after a time of predetermined starting or in the event of rise in temperature.

In the case of the first mode of realization, the electromagnetic relay 6 can be of the type closed at rest what brings the

starting capacitor into service at the same time as the engine but obliges to maintain the reel of actuation in tension during the operation of the engine with nominal speed.



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### CLAIMS

1. Device of connection of a starting capacitor (5) to an engine single-phase current including/understanding at least a principal rolling up (1) and an auxiliary rolling up (4), auxiliary rolling up (4) being gone up in series with the starting capacitor (5) in an auxiliary circuit assembled simultaneously with the principal rolling up (1), characterized in that it comprises of the means of taking away (13, 14) of a principal tension at the boundaries of principal rolling up (1), means of taking away (15, 14) of an auxiliary tension at the boundaries of auxiliary rolling up (4), means of order (12) connected to the means of taking away to determine one moment when the principal tension (V) and the auxiliary tension (v) are in a report/ratio (K) predetermined, and means of commutation (6) in the auxiliary circuit, in series with the auxiliary rolling up and starting capacitor (5), (4) and connected to the means of order (12) to open or complete auxiliary in response to signals of the means of order (12).
2. Device of connection of a starting capacitor in conformity with claim 1, characterizes in that the means of commutation (6) comprise an electromagnetic relay including/understanding of the fixed contacts (9) separated, in series with the capacitor starting, a mobile contact (8) laid out compared to the fixed contacts (9) and a reel of actuation (7) gone up simultaneously with the feeding circuit of the engine and associated the mobile contact (8); and a semiconductor component (10) laid out in series with the reel of actuation (7) and having a body of blocking (11) connected to the means of order (12).
3. Device of connection of a starting capacitor in conformity with claim 2, characterized in that the semiconductor component is a triac.
4. Device of connection of a starting capacitor conforms to claim 2 or the reven < RTI ID=9.1> diction < /RTI> 3, characterized in that the electromagnetic relay is opened at rest.
5. Device of connection of a starting capacitor in conformity with claim 1, characterized in that the means of commutation comprise a semiconductor component (10) laid out in series in the auxiliary circuit and having a body of blocking (11) connected to the means of order (12).
6. Device of connection of a starting capacitor in conformity with claim 5, characterized in that the semiconductor component (10) is a triac.

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